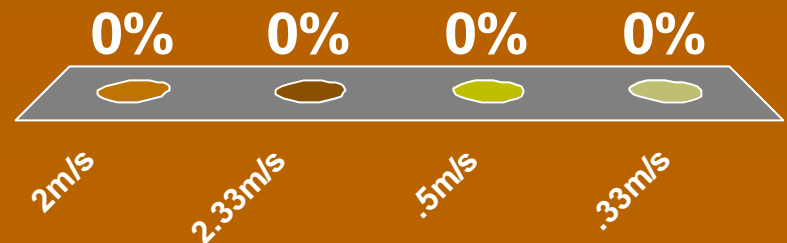


A hover puck sitting at the 1 m mark is hit forward. It takes 3 seconds to travel to the 7m mark. Find the puck's average velocity.

1. 2m/s
2. 2.33m/s
3. .5m/s
4. .33m/s



Lesson #7

9/12/06

Topic: Instantaneous and Changing Velocity

Objectives: (After this class I will be able to)

1. Explain the difference between average and instantaneous velocity
2. State three ways to change an object's velocity

Project: Find the velocity of the trolley.

Assignment: Chapter 3 Practice Problems 6 -10 & 18 – 21
Due tomorrow!

Acceleration Trolley Demonstration:

- What is the average velocity of the trolley?
- What is the initial instantaneous velocity of the trolley?
- Calculate the final instantaneous velocity of the trolley using
$$\bar{v} = \frac{v_f + v_i}{2}$$
- How much time was the trolley in motion?
- How much did the velocity of the trolley change during this time?
- What was the change in velocity per unit of time?

This is the trolley's acceleration.

Acceleration

Acceleration is the rate of change of an objects velocity.

$$a = \frac{\Delta v}{\Delta t}$$

This expression is more useful if we treat it as:

$$a = \frac{v_f - v_i}{t}$$

An object can change it's velocity (accelerate) by:

1. Speeding up
2. Slowing down
3. Changing direction

Solving a Physics Problem

Every physics problem can be solved easily by taking the correct steps:

1. Determine what variable you are looking for.
2. Make a list of all of your given information.
3. Write an equation(s) that contains most or all of the variables listed in your given column.
4. Manipulate the equation(s) to isolate the variable you are looking for.
5. Plug the numbers into your algebraic solution.

Practice Problems

1. Grace is driving down the road going 30 m/s when a deer jumps out in front of her. She stops her car in 3 seconds. What was the acceleration of her car?

Practice Problems

2. Joe is racing his Mustang in a competition. His car can accelerate at a rate of 5 m/s^2 . He starts from rest and gets his car up to 40 m/s . How long did it take for the car to get up to this speed?

Practice Problems

3. Jane is traveling down the interstate at 25m/s when she needs to slow down for a construction zone. She accelerates at a rate of -2m/s^2 for 5 seconds. What is her speed through the construction zone?

Lesson #8

Topic: Graphing Acceleration

Objectives: (After this class I will be able to)

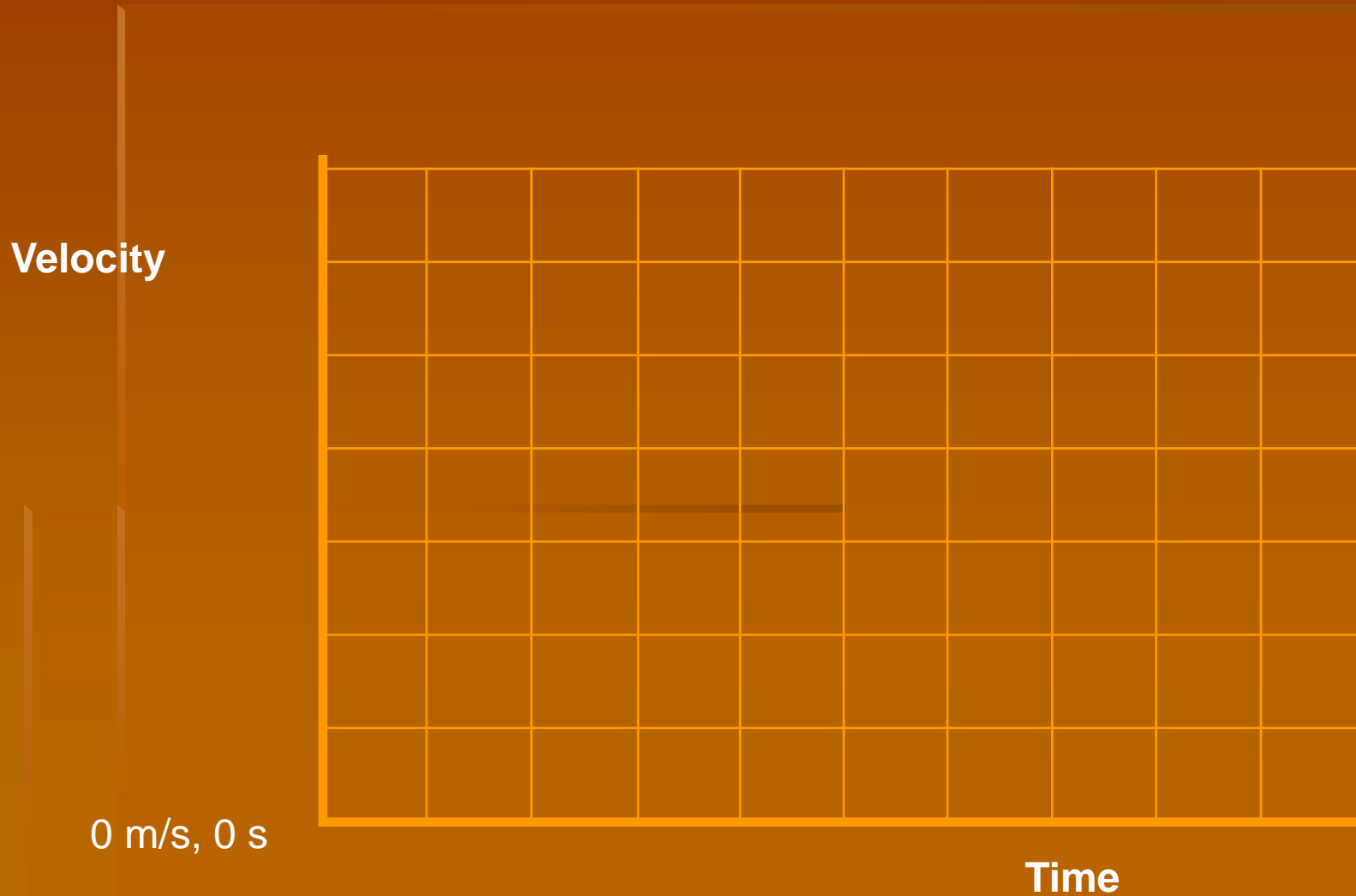
1. Create a velocity vs. time graph for the motion of an object
2. Describe the motion of an object given a velocity vs. time graph

Project: Match the graph using a motion detector.

Assignment: “Graphing Acceleration” and
“Physics Practice”

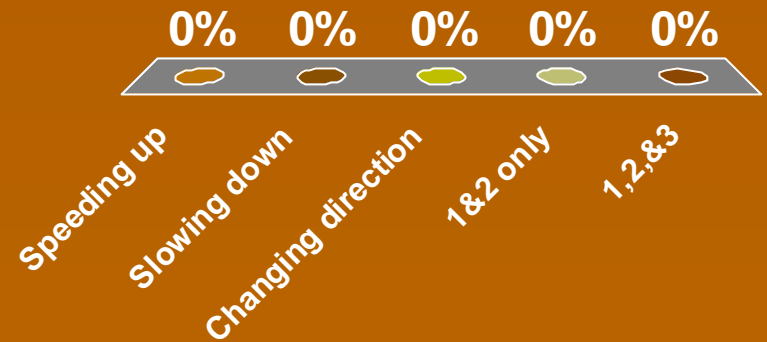
Graphing Motion

Describe the motion of the following object.



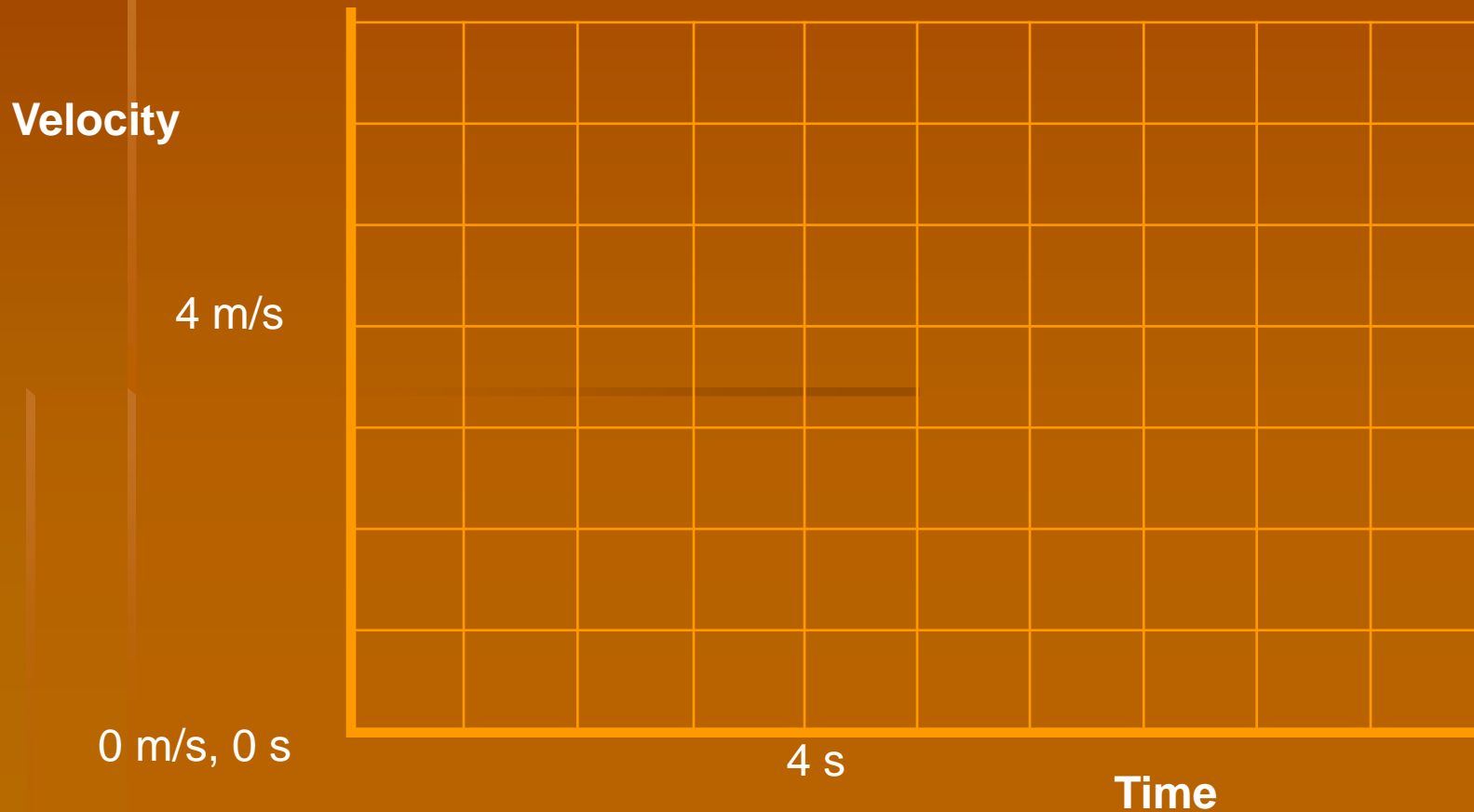
Acceleration is ...

1. Speeding up
2. Slowing down
3. Changing direction
4. 1&2 only
5. 1,2,&3



Graphing Motion

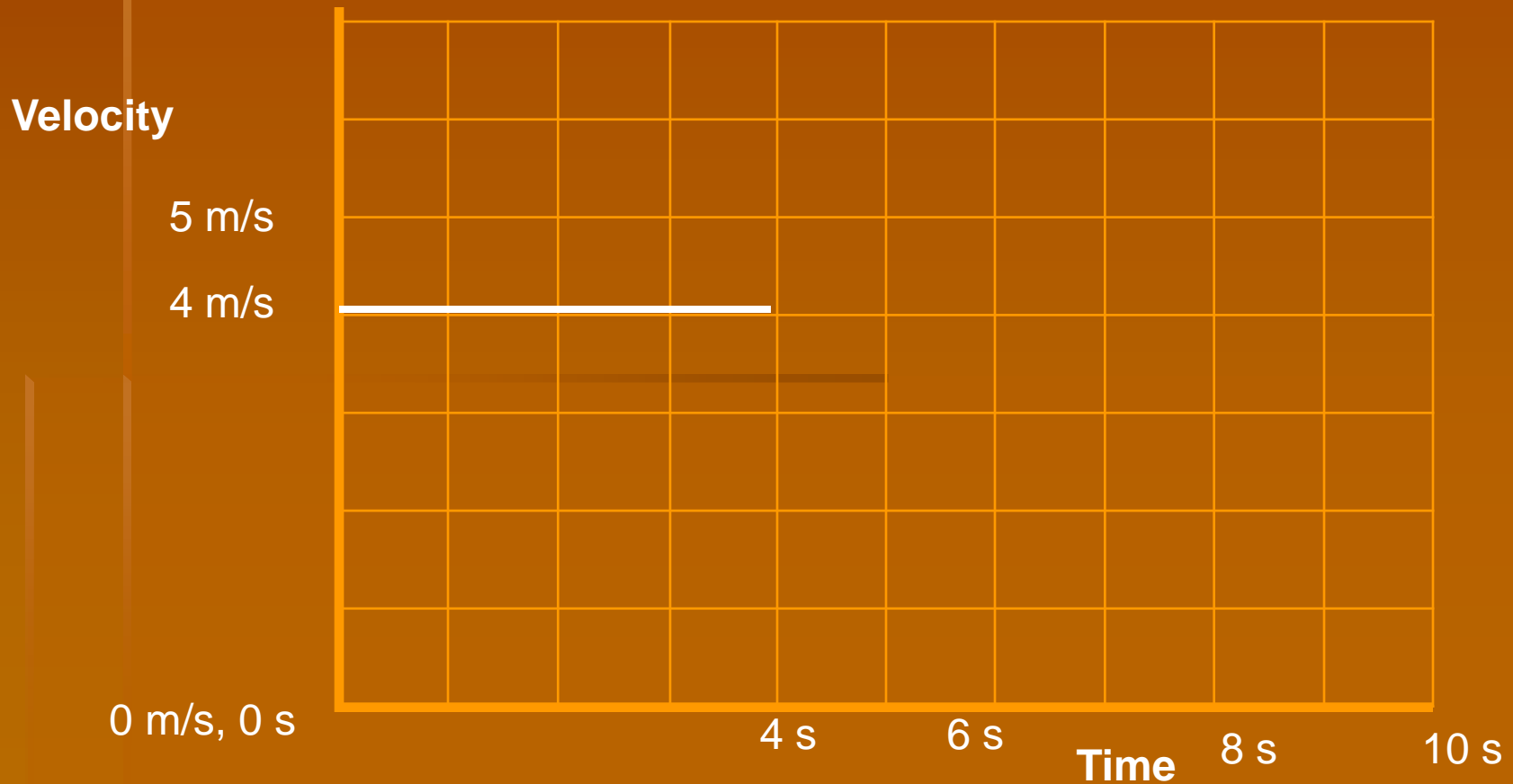
A woman is out for her morning jog. She runs at a constant speed of 4 m/s for 4 seconds before needing to slow down for an upcoming traffic light.



Graphing Motion

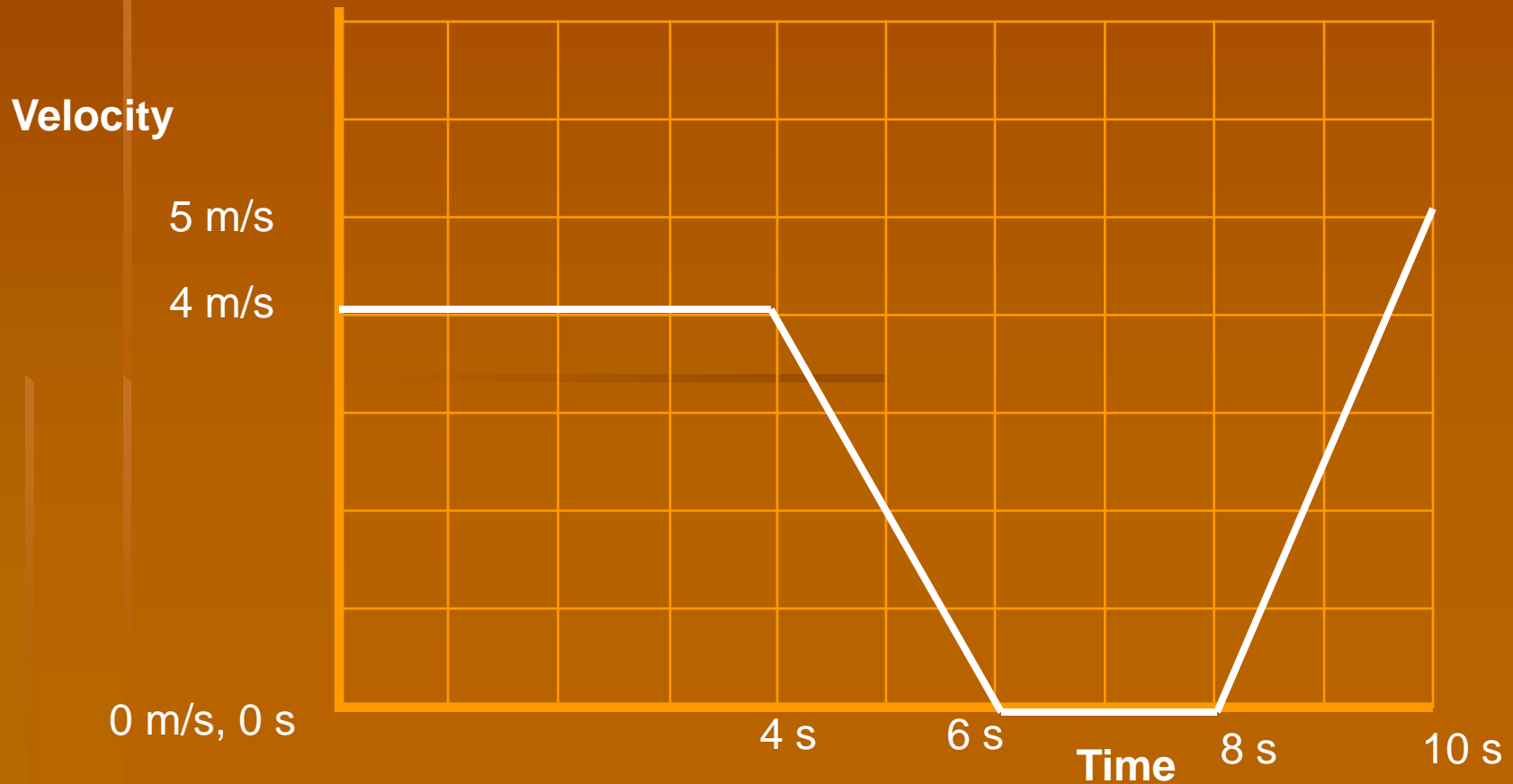
She slows down to a stop in 2 seconds.

She waits at the corner for 2 more seconds, before crossing the street and speeding back up to 5 m/s in 2 seconds.



Graphing Motion

Find the acceleration of the woman for each section of time in this graph.



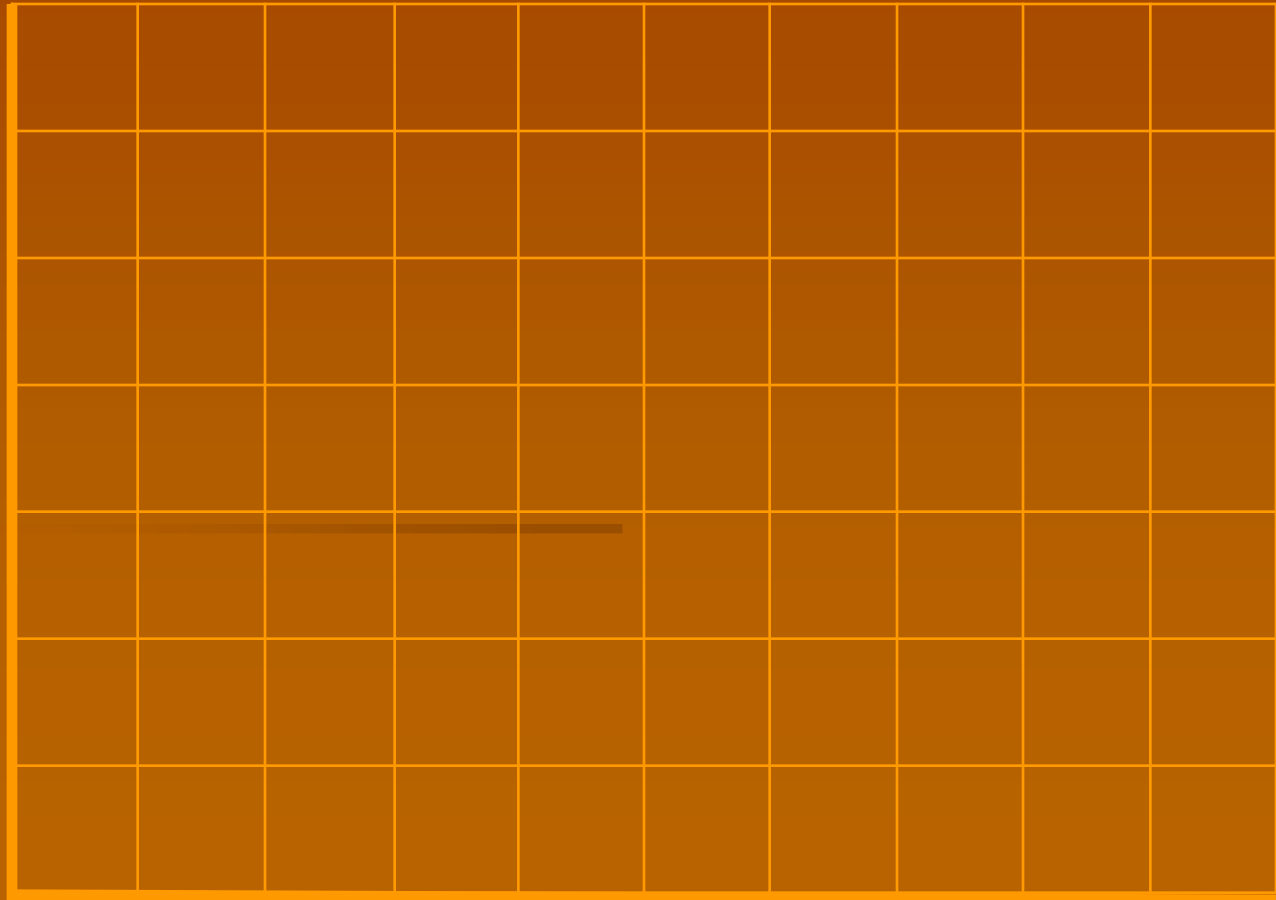
Graphing Motion

Trolley graph

Velocity

0 m/s, 0 s

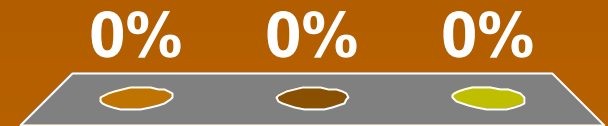
Time



An object has an initial speed of 30 m/s and a final speed of 60 m/s.

Which of the following is correct?

1. The object's speed is constant.
2. The object's speed is **not** constant.
3. We are unable to determine whether the speed is constant or not without more information.



The object's speed is...

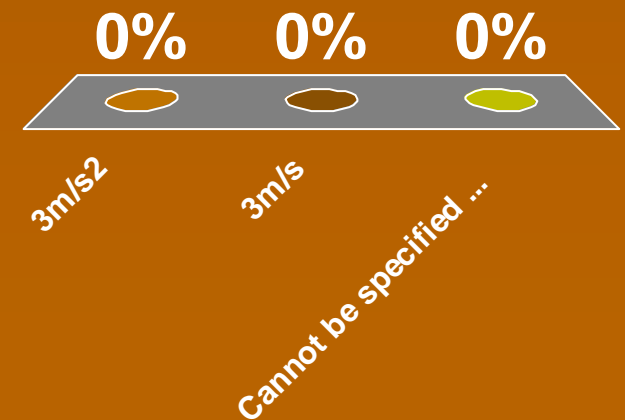
The object's speed is ...

We are unable to det...

At a certain moment, an object is sliding toward the left at a speed of 3 m/s along a horizontal surface. You are given no information on whether it is slowing down, speeding up or moving with a constant speed.

What is its acceleration?

1. 3m/s^2
2. 3m/s
3. Cannot be specified without more information.



Lesson #9

Topic: Exam 1 Review

Stuff to do today

1. Practice solving physics problems
2. Complete and check Exam 1 Review
3. Plan a tutoring time (if needed)
4. Complete a bonus problem opportunity
5. Make sure all assignments are completed

Warm Up: What are the five steps (in order) to solving a physics problem?

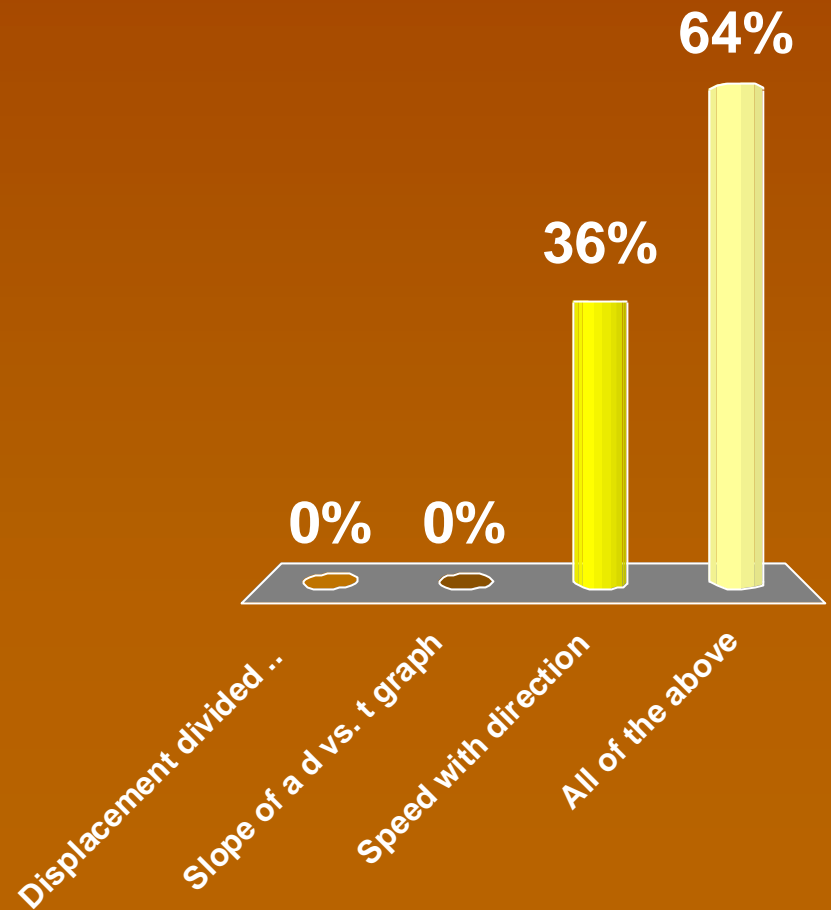
Assignment: Study for Exam #1

Vocab Review

- What does **relative motion** mean?
- Define **rate**.
- Define **speed**.
- What are the 3 SI units used in this class?
- Define **scalar**.
- Define **vector**.
- Define **displacement**.

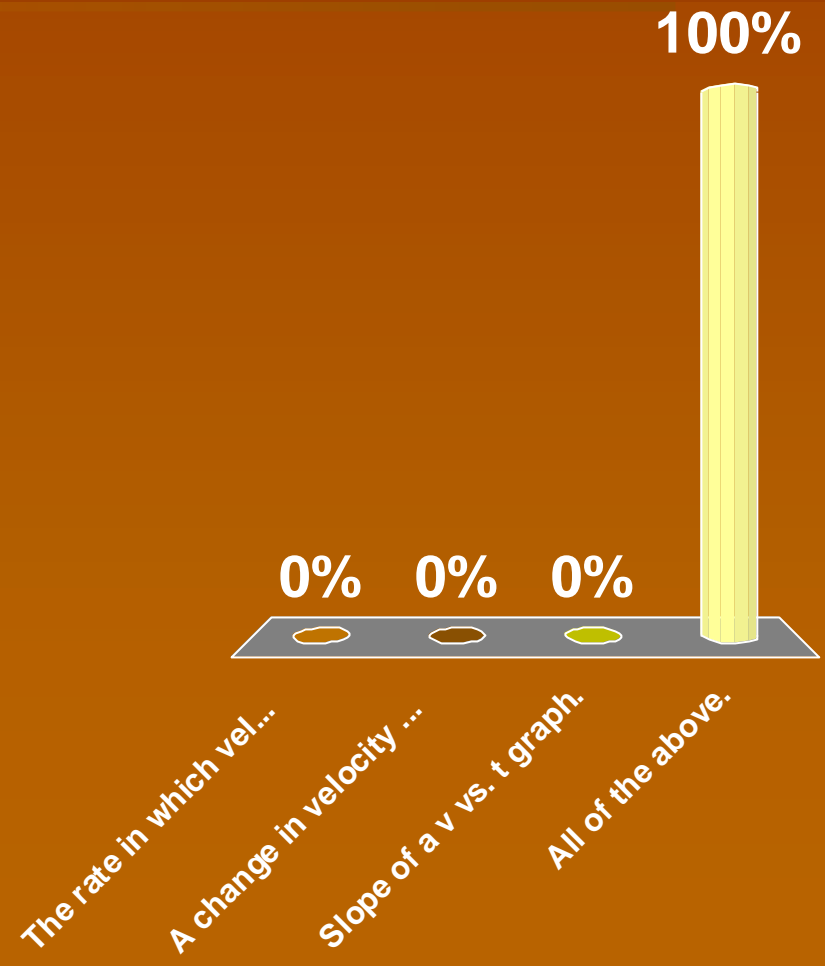
Velocity is...

1. Displacement divided by time
2. Slope of a d vs. t graph
3. Speed with direction
4. All of the above



Acceleration is...

1. The rate in which velocity changes.
2. A change in velocity divided by time.
3. Slope of a v vs. t graph.
4. All of the above.



Algebra

Solve for v_i

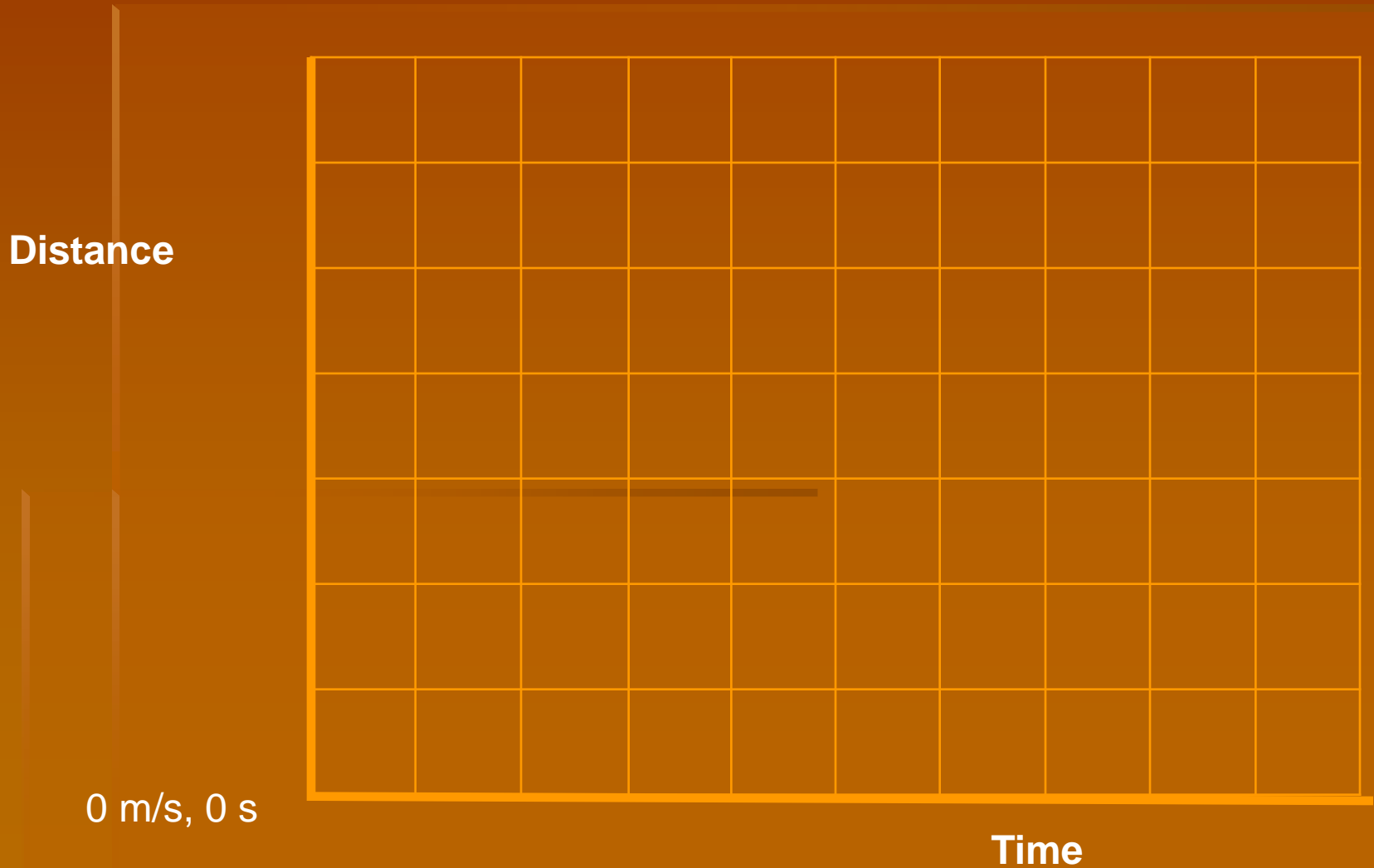
$$a = \frac{v_f - v_i}{t}$$

Solve for a

$$d = v_i t + \frac{1}{2} a t^2$$

Graphing Motion

Find the velocity for each section of time.



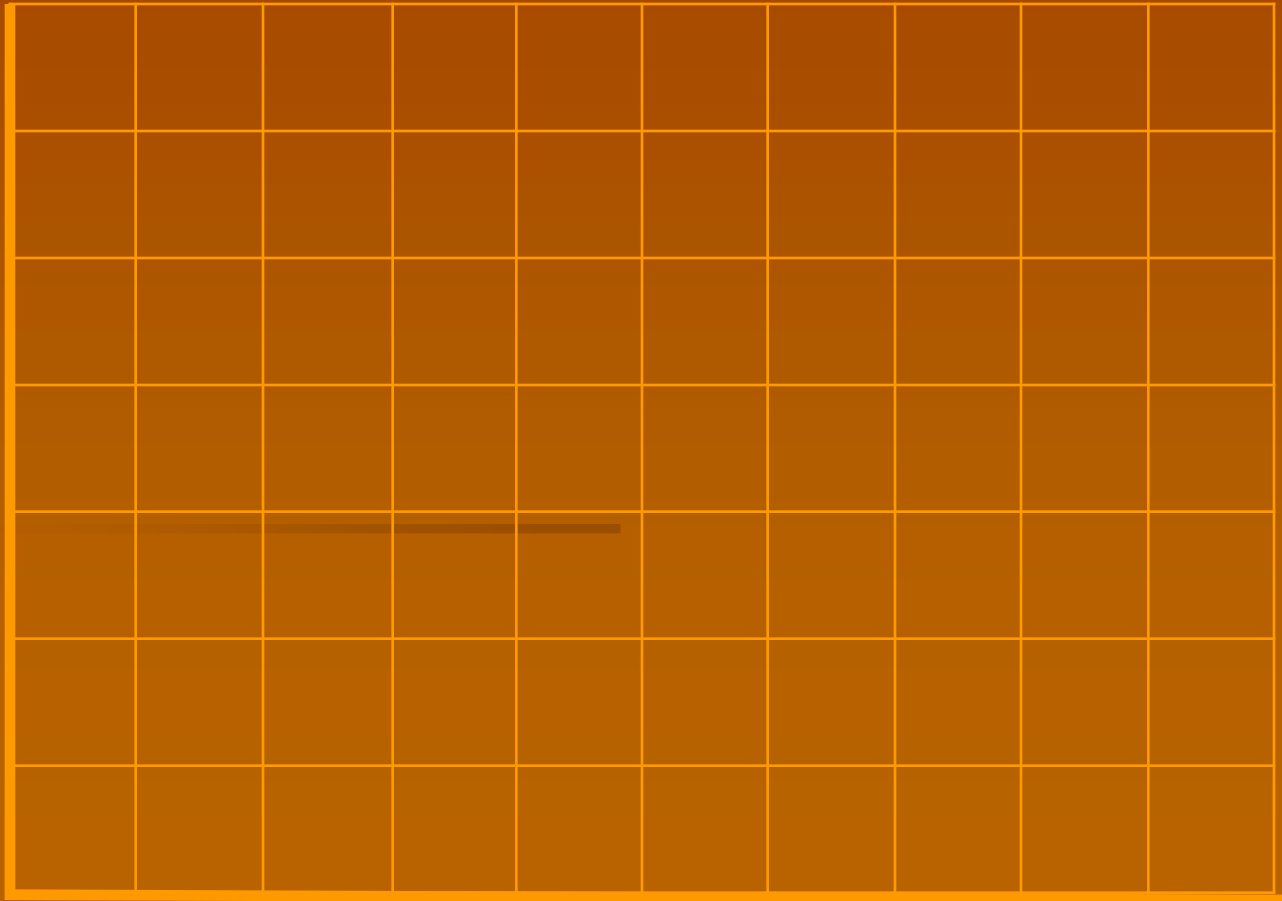
Graphing Motion

A boy is running at a constant velocity of 3m/s for 3 seconds, slows to a stop in 3 seconds and then stands there for 2 seconds, then accelerates to 2m/s in 2 seconds.

Velocity

0 m/s, 0 s

Time



Bonus Problems:

2 pts each

(To be handed in on a separate sheet of paper.)

1. A man walks to his friend's house. He walks 20 m east, then 30 m north, and then 20 m east. Find the man's total distance traveled and final displacement.
2. A truck is driving in the right lane on the interstate with a speed of 9 m/s. A car is 30 m behind the truck moving with a speed of 27 m/s. If the vehicles maintain this speed, how far must the car travel before it catches up with the truck? How long will this take? (*hint* remember motion is relative)